

CLAIMS

[Claim 1]

An insulating material used in insulating layers between electric wirings, comprising a borazine-silicon polymer obtained by hydrosilylation polymerization of:

a borazine compound represented by Chemical Formula 1 possessing an alkyl group for a nitrogen atom and an alkyl group-substituted triple bond-containing organic group for a boron atom in a borazine ring, in which the boron atom has an acetylene group directly linked thereto or R_2 and an acetylene group jointly linked thereto; and

a silicon compound represented by Chemical Formula 2 possessing at least two hydrosilyl groups or a cyclic silicon compound represented by Chemical Formula 3 possessing at least two hydrosilyl groups; in which Chemical Formulae:

R_1 denotes an alkyl group,

R_2 denotes $-(CH_2)_m$ (m denoting an integer of 0 or more),

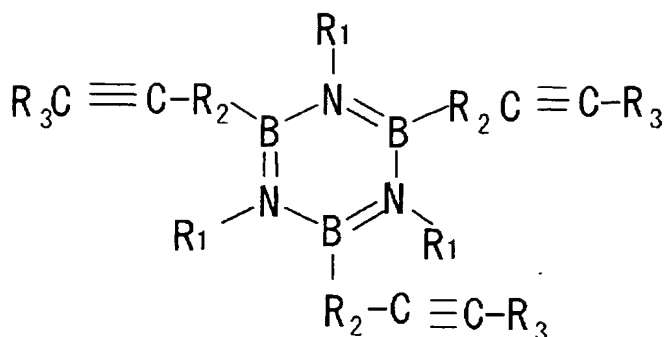
R_3 denotes an alkyl group linked to an acetylene group,

R_4 and R_5 each denote one identical or different monovalent group selected from ones consisting of an alkyl group, an aryl group, an aralkyl group and a hydrogen atom,

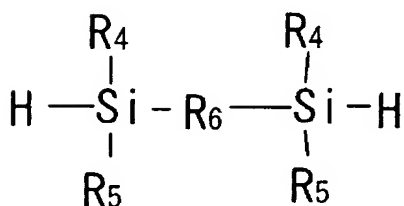
R_6 denotes a divalent aromatic group optionally possessing a substituent group, an oxygen atom or a siloxane including that of an oxypoly(dimethyl siloxy) group, and

R_7 denotes an alkyl group, an aryl group or an aralkyl group.

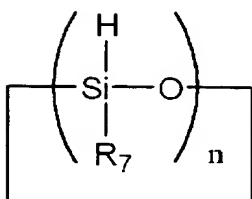
[Chemical Formula 1]



[Chemical Formula 2]



[Chemical Formula 3]



[Claim 2]

An insulating material used in insulating layers between electric wirings, comprising a borazine-silicon polymer obtained by hydrosilylation polymerization of:

a mixture of a borazine compound represented by Chemical Formula 4 possessing an alkyl group for a nitrogen atom and an alkyl group-substituted triple bond-containing organic group for a boron atom in a borazine ring, in which the boron atom has an acetylene group directly linked thereto or R₂ and

an acetylene group jointly linked thereto and a borazine compound represented by Chemical Formula 5 possessing an alkyl group for a nitrogen atom and a triple bond-containing organic group not substituted by an alkyl group for a boron atom in a borazine ring, wherein the boron atom has an acetylene group directly linked thereto or R_2 and an acetylene group jointly linked thereto; and

a silicon compound represented by Chemical Formula 6 possessing at least two hydrosilyl groups or a cyclic silicon compound represented by Chemical Formula 7 possessing at least two hydrosilyl groups, in which Chemical Formulae:

R_1 denotes an alkyl group,

R_2 denotes $-(CH_2)_m$ (m denoting an integer of 0 or more),

R_3 denotes an alkyl group linked to an acetylene group,

R_4 and R_5 each denote one identical or different univalent group selected from ones consisting of an alkyl group, an aryl group, an aralkyl group and a hydrogen atom,

R_6 denotes a divalent aromatic group optionally possessing a substituent group, an oxygen atom or a siloxane including that of an oxypoly(dimethyl siloxy) group,

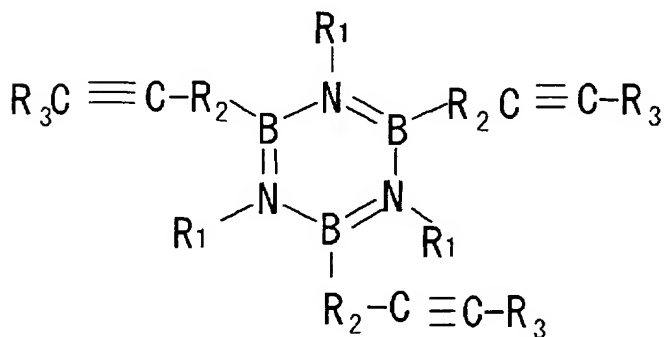
R_7 denotes an alkyl group, an aryl group or an aralkyl group,

R_8 denotes an alkyl group,

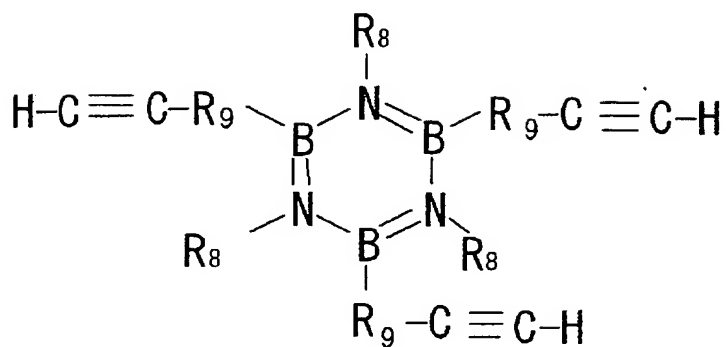
R_9 denotes a methylene group, and

n denotes an integer of 3 or more.

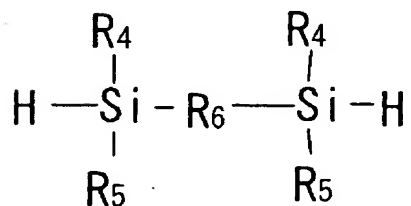
[Chemical Formula 4]



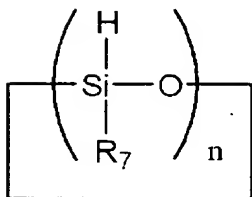
[Chemical Formula 5]



[Chemical Formula 6]



[Chemical Formula 7]



[Claim 3]

A semiconductor device, comprising a wiring structure provided with a first wiring layer formed on a surface of a semiconductor region forming an active component or a passive component aimed at and a second wiring layer

formed in an upper layer of the first wiring layer and also provided with a first insulating structure insulating the semiconductor region and the first wiring layer, a second insulating structure insulating a distribution interlayer formed of the first wiring layer, a third insulating structure contained in a structure electrically insulating the first wiring layer and the second wiring layer and forming connecting holes electrically connecting the first wiring layer and the second wiring layer, and a fourth insulating structure insulating a distribution interlayer formed of the second wiring layer, and further provided with a fifth insulating layer formed of the interlayer insulating material in (1) a region interposed between the first insulating structure and the fourth insulating structure relative to a direction of film thickness and excluding the connecting holes electrically connecting the first and second wiring layers relative to a plane, (2) a region interposed between the first insulating structure and the fourth insulating structure relative to the direction of film thickness and excluding the wiring by the first wiring layer relative to the plane, (3) a region disposed in a region higher than the first insulating structure relative to the direction of film thickness and excluding the connecting holes for electrically connecting the second and third wiring layers relative to the plane, or (4) a region higher than the first insulating structure relative to the direction of film thickness and excluding the wiring by the third wiring layer relative to the plane.

[Claim 4]

A semiconductor device, comprising a wiring structure provided with a first wiring layer formed on a surface of a semiconductor region forming an active component or a passive component aimed at and a second wiring layer formed in an upper layer of the first wiring layer, also provided with a first insulating structure insulating the semiconductor region and the first wiring layer, a second insulating structure insulating an interlayer formed of the first wiring layer, a third insulating structure contained in a structure electrically insulating the first wiring layer and the second wiring layer and forming

connecting holes electrically connecting the first wiring layer and the second wiring layer, and a fourth insulating structure insulating an interlayer formed with the second wiring layer, and further incorporating in one of the second, third and fourth insulating structures the insulating material according to any one of claim 1 to claim 2.